

### REMARKS

The Final Office Action rejected Claims 35-41 as being unpatentable over a combination of *Durocher et al.* (U.S. Patent No. 6,614,103) in view of *Baik et al.* (U.S. Patent Publication 2004/0108511) and *Baretz et al.* (U.S. Patent No. 6,600,175).

As set forth in MPEP 2142,

To reach a proper determination under 35 U.S.C. §103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

The *Durocher et al.* reference taught a flexible plastic packaging of LED arrays by mounting rigid carriers 21 onto a thin film flexible base 41 such as a plastic sheet as taught in Column 5, Lines 17-31. The base is preferably a prefabricated structure with electrodes 49 extending through the flexible base.

Accordingly, *Durocher et al.* does not teach the formation of multilayer epitaxial structure as formed on our base substrate, and as shown for example in Figure 2A and Figure 3A of our disclosure.

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would be lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*,

721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

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Rather, *Durocher et al.* teaches a rigid carrier 21 and as can be seen in Figure 7, provides bonding pads 61 for adhering a multilayer epitaxial structure on top of the bonding pads that in turn are positioned on top of the rigid carrier which in turn is mounted through a vertically conductive adhesive 53 to a flexible base 41. These features are consistent with the stated purpose of the *Durocher et al.* reference, mainly to provide a flexible circuit module that can be bent into different desirable shapes while still supporting LEDs through a rigid carrier. See Column 3, Lines 10-30.

An isotropic conductive adhesive that only electrically conducts, for example along the vertical or Z axis is provided between a rigid carrier and the flexible base as taught in Column 5, Line 63 to Column 6, Line 3.

The Final Office Action recognized that the specific multilayer epitaxial structure is not shown in the *Durocher et al.* reference. It suggests, however, that Figure 2 of the *Baik et al.* patent could be relied upon to teach our epitaxial structure.

The *Baik et al.* reference would suggest to a person of ordinary skill in this field the advantages of a composite reflective layer provided on the back of an apparent transparent substrate such as a sapphire substrate 2 in the prior art shown in Figure 1. The reflective layer has a core of aluminum 35 and is sandwiched with a first alumina layer ( $\text{Al}_2\text{O}_3$ ) to help provide an adhering surface to the sapphire substrate and a second bottom protective layer of aluminum oxide completes the reflective structure.

The *Baik et al.* reference teaches a first n-clad layer 24 directly on the substrate 22, an active layer 26 on the n-type clad layer 24, and a second p-type clad layer 28 formed on the

surface of the active layer 26. Electrode contact pad 31 on the n-clad layer and p-contact pad 33 on the surface of the second p-clad layer 28 are also shown. See Paragraph 0036 to 0038.

In summary, a person of ordinary skill would be directed to the alleged improvement of the composite bottom reflective surface to improve the luminance of the LED of *Baik, et al.*

As can be appreciated, the LED structure of *Baik et al.* could not be substituted for the LED 59 shown in the *Durocher et al.* disclosure. The conductive adhesive 53 would not be appropriate even if the *Durocher et al.* reference was modified to remove the rigid carrier. More appropriately, bonding pads 61 shown in Figure 7 would not be appropriate for attachment to the protective aluminum oxide underside.

As can be appreciated, significant alterations would have to be undertaken in an attempt to replicate the present invention. The only template, however, for directions to make such alterations would be in hindsight from our present invention.

“When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself.”

*Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985).

Additionally, neither the *Durocher et al.* nor the *Baik et al.* reference teaches the uneven main surface on a p-type semiconductor layer as defined, for example in Claim 47. Certainly there is no teaching of improving a light extraction efficiency in this manner. *Durocher et al.* addresses the light extraction by providing the side wall reflectors 57 on the slanted surfaces of the rigid carrier 31.

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.”

*In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994); *see KSR*, 127 S. Ct. at 1739-40 (explaining that when the prior art teaches away from a combination, that combination is more likely to be nonobvious). Additionally, a reference may teach away from a use when that use would render the result inoperable. *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1354 (Fed. Cir. 2001).

*In re Icon Health and Fitness, Inc.* 2007 U.S. App. Lexis 18244,  
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Of course, the *Baik et al.* reference only teaches to improve the light efficiency by providing a reflector on the rear surface of the transparent substrate, but *Durocher et al.* uses the bonding pads 61 on the rear surface of its LEDs.

The *Baretz et al.* reference was basically cited for a feature of immersing the LED dies in a light emitting polymer 63 capable of down converting short wave length emissions of the LED array into white light. As noted in Column 12, Lines 25-38, there is no specific concern as to the configuration of the light emitting diodes since the *Baretz et al.* reference was seeking to teach the prior art how to utilize a short radiation emitting LED, for example in a blue or UV light range for the light emitting polymer 63 to provide a conversion of the radiation from the LED array into white light.

The embodiment cited in the Final Office Action of Figure 5 discloses a series of LEDs mounted on a conductive substrate 42, see Column 12, Line 3, with each of the LED dies 41 in electrical contact on its bottom surface. A single lead 44 passes to the exterior of the cell in a bottom wall member while the top faces of the LED dies are connected by a series connection of wires 43. See Column 12, Lines 2-11.

As shown in Figure 5, there are two side walls 48 and a transparent top wall member 49. See Column 11, Lines 58-65. The fact that a frame is filled with the phosphor film 63 only incidentally covers the side of the LEDs, since only the top cover 49 is transparent. The real

teaching that a person of ordinary skill would appreciate is the use of special low wave length LEDs for interacting with a particular type of phosphor film for conversion to white light.

Needless to say, this reference does not resolve the deficiencies of the prior references such as the structural position and connections described in Claim 35.

In addition, the irregular or uneven n-type semiconductor layer in Claim 39 is certainly not found or taught in any of the references, including *Baik et al.* None of the references teach or suggest such a feature for improving a light extraction efficiency.

In summary, the *Durocher et al.* reference does not provide the structural claim elements set forth in Claim 35. It also does not teach a description of phosphors.

The *Baretz et al.* reference discloses phosphors, but the structure is significantly different from an LED device of our present claims.

The *Baik et al.* reference, which has a transparent substrate with bottom reflection film layers, discloses a structure that is significantly different from the LED of our present application. Additionally, the combination of these references do not suggest each of the elements defined in our current claims.

Our invention eliminates the unevenness of color in the final production products by permitting a testing of the emission of light during the manufacturing process and reduces a mounting area. None of these references provide a structure that would enable such advantages to be realized.

It is the Examiner's burden to establish *prima facie* obviousness. See *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993) Obviousness requires a suggestion of all the elements in a claim (*CFMT, Inc. v. Yieldup Int'l Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003)) and "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). Here, we find that the

Examiner has not identified all the elements of claim 1, nor provided a reason that would have prompted the skilled worker to have arranged them in the manner necessary to reach the claimed invention.

*Ex parte* Karoleen B. Alexander, No. 2007-2698, slip op. at 6 (B.P.A.I. Nov. 30, 2007)

In summary, applicant has further amended Claim 35 to define the insulating film that separates the first electrode 24 shown in Figure 2 and the second electrode 20 and 22 of Figure 2. The amendment to Claim 35 is further supported by Paragraph [89] and the description regarding the Reference No. 28 of Figure 2 and, therefore, cannot constitute new matter.

The *Baik* reference cited by the Examiner in relation to the diode structure includes neither a description of the structure of the present invention after our amendments, nor even a suggestion of a diode structure. This can be also be said of the *Durocher* and *Baretz* references.

In addition, because of size reduction which is the problem addressed by the present invention, the film pattern of the diode becomes finer, which may possibly lead to a problem of an electrical short between leads (and between an electrode and a lead as well as between electrodes) due to inferior patterning and inclusion of impurity in the phosphor film covering the diode. Such a problem can be addressed according to the structure of Claim 35. This structure cannot be readily conceived even by combining the above three references and commonly-known technology at the time the present application was filed.

The provision of a phosphor film with even thickness is also supported by paragraph [108] and, therefore, cannot be regarded as addition of new matter. In order to avoid the occurrence of unevenness of color in the semiconductor light emitting device, which is the main problem of the present invention to be solved, the balance of color combination between the light emitted from an light emitting device (especially the epitaxial film structural member) and

coming out after penetrating the phosphor film and the light emitted from the phosphor excited by the emission from the light emitting device has to be maintained uniformly. Claim 35 “a phosphor film having an even thickness” is added to state the feature of the present invention which is effective to solve unevenness of color in such a light emitting device.

None of the above three references recognizes the problem of color unevenness nor suggests a solution like the structure of the present invention.

Claim 46 is a newly added claim, and supported by the through holes 42 and 46 shown in Figures 1 and 2 as well as the description in paragraph [91] in the specification.

According to *Drocher* cited by the Examiner in relation to the through holes and base substrate, it cannot be definitely said that any through holes are located in periphery of the base substrate.

If the through holes are provided under the multilayer epitaxial structure, the rate of thermal expansion differs between where through holes are disposed and not disposed. As a result, stress distribution becomes uneven, responsible for potential cracking. As stated in the claim, by providing through holes so as not to be covered by the multilayer epitaxial structure, the problem caused by the unevenness of stress distribution is expected to be prevented.

Newly drafted Claim 47 utilizes “means for improving a light extraction efficiency” in the form of a means plus function step under 35 U.S.C. §112, sixth paragraph.

The MPEP §2182 states that “application of a prior art reference to a means or step plus function limitation requires that the prior art element perform the identical function specified in the claim. However, if a prior art reference teaches identity of function to that specified in a claim, then...an examiner carries the initial burden of proof for showing that the prior art structure or step is the same as or equivalent to the structure, material, or acts described in the

specification which has been identified as corresponding to the claimed means or step plus function.” The “means or step plus function” limitation should be interpreted in a manner consistent with the specification disclosure. *See In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994).

None of the references cited teach or describe such a function limitation, let alone prior art structures that could be considered to be the same or equivalent to the structure and material described in our specification.

This is consistent with the fact that the cited references are really not addressing, recognizing nor solving the problems defined in our specification.

As such, the cited references fail the *KSR* guidelines on obviousness that requires an explicit analysis for finding the reasons why you would combine known elements that are to function in the same manner described in the specification of the cited patents, to suggest to a person of ordinary skill in this field the present invention as defined in our claims.

Accordingly, applicant submits that the present claims should be allowable and that the amendments proposed have reduced the number of issues for purposes of any appeal.


It is accordingly requested that the Amendment be entered and the case passed to allowance.



If the Examiner has any questions with regards to the prosecution of this case, the undersigned attorney can be contacted at the listed phone number.

Very truly yours,

**SNELL & WILMER L.L.P.**



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